

AMENDMENTS TO THE SPECIFICATION

Please replace Paragraph [0005] with the following rewritten paragraph-

[0005] The pressure differentials (1) between the supply manifold and the exhaust manifold, and (2) between adjacent flow channels, or segments of the same flow channel, are, of considerable importance in designing a fuel cell. Serpentine channels have been used to achieve desired manifold-to-manifold pressure differentials as well as inter-channel pressure differentials. Serpentine flow-channels have an odd number of legs extending, in switchback style, between the supply and exhaust manifolds of the stack. Serpentine flow channels use various widths, depths and lengths to vary the pressure differentials between the supply and exhaust manifolds, and may be designed to drive some reactant gas trans-land between adjacent channels, or between adjacent segments of the same channel, via the current collecting diffusion layer in order to expose the MEA confronting the land separating the legs to reactant. For example, some gas can flow from an upstream leg of a channel (i.e. where pressure is higher) to a parallel downstream leg of the same channel (i.e. where the pressure is lower) by moving the gas through the diffusion layer engaging the land that separates the upstream leg from the parallel downstream leg. Non-serpentine flow-channels have been proposed that extend more or less directly between the supply and exhaust manifolds, i.e. without any hairpin/switchback-type turns therein, and hence in shorter lengths than the serpentine flow-channels. Pressure differential management is more difficult with non-serpentine flow-channels than with serpentine flow-channels.

Please replace Paragraph [0006] with the following rewritten paragraph-

[0006] The present invention is directed to a PEM fuel cell flow-field that offers significant design flexibility in achieving desired

pressure differentials between the supply and exhaust manifolds, ~~and~~ between adjacent flow-channels, and/or between segments of the same flow-channel. The invention utilizes flow-restrictions strategically located throughout the flow-field to achieve the desired pressure differentials, and is particularly useful with non-serpentine flow-channels.

Please replace paragraph [0007] with the following rewritten paragraph-

[0007] The present invention relates to a PEM fuel cell of the type that has (1) a proton exchange membrane having opposing cathode and anode faces, (2) a gas-permeable, electrically-conductive current collector engaging at least one of the faces, and (3) a current-collecting plate engaging the gas-permeable current collector, which current-collecting plate has a gas flow-field thereon that confronts the gas-permeable current collector. The flow-field comprises a plurality of lands that engage the gas-permeable current collector, and define a plurality of gas flow-channels through which the gaseous reactants (i.e. H_2 and O_2) flow. The flow-channels each have (a) an inlet end communicating with a supply manifold that supplies a reactant gas to the flow-channels at a first pressure, and (b) an exit end communicating with an exhaust manifold that receives the reactant gas from the flow-channels at a second pressure less than the first pressure. In accordance with the present invention, there is provided: (1) a first flow-restrictor in a first flow-channel for reducing the first pressure to a second pressure downstream of the first flow-restrictor that is less than the first pressure; and (2) a second flow-restrictor in a second flow-channel, next adjacent the first flow-channel, for maintaining a third pressure in the second flow-channel upstream of the second flow-restrictor sufficiently above the second pressure that it drives some of the gas from the second flow-channel into the first flow-channel through the gas-permeable current collector that engages the land that

separates the two flow-channels. The flow-restrictor will preferably comprise a constriction in the flow channel that has a smaller cross-sectional area than the flow-channel itself. Alternatively, the flow-restrictor could be a tortuous segment of flow-channel, or ports at the entrance to and exits from the flow-channels that are smaller than the flow-channels themselves. The flow-restrictors will preferably be located proximate the inlet and exit ends of the flow-channels where they can impact the upstream and downstream pressures over the longest lengths of flow-channel.

Please replace paragraph [0008] with the following rewritten paragraph-

[0008] According to a preferred embodiment of the invention, a non-serpentine flow- field has a plurality of flow-channels each of which has (a) an inlet leg communicating with the supply manifold, (b) an exit leg communicating with the exhaust manifold, (c) at least one medial leg intermediate the inlet and exit legs, (d) a first flow-restrictor in the inlet leg of a first flow-channel for producing a second pressure downstream of the first flow-restrictor that is less than a first pressure in the supply manifold, and (e) a second flow-restrictor in the exit leg of a second flow-channel next adjacent the first flow-channel for maintaining a third pressure in the second flow-channel upstream of the second flow-restrictor that is sufficient to drive the gas between the first and second flow-channels through the gas permeable current collector that engages the land that separates the two flow-channels. Most preferably, each flow channel has a branched midsection so as to provide a medial leg that has at least first and second branches, each of which has a first end communicating with the inlet leg of the flow-channel, and a second end communicating with the exhaust leg of the flow channel. In this context (i.e. a flow-field having branched

midsection): (i) one embodiment of the invention has the flow-restrictors located only in the inlet and outlet legs of the flow-channels; (ii) another embodiment has the flow-restrictors located only in the branches of the ~~bifurcated~~branched midsection; and (iii) in still another embodiment, the flow-restrictors are located in both the inlet/outlet legs and in the branches of the ~~furcated~~branched midsection.

Please replace paragraph [0024] with the following rewritten paragraph-

[0024] Figs 3 and 4 are, respectively, an enlarged, isometric view of the corner of plate 58 where indicated on Fig. 2, and a plan view of plate 58 more clearly showing: several flow-restrictors 94 in the inlet legs 96 of the flow-channels 66; the several flow-restrictors 98 in the exit legs 100 of flow-channels 66; and the several flow-restrictors102 in the branches/medial legs 104 and 106 of bifurcated flow-channels 66. In this regard, each flow channel has an inlet leg 96 communicating with the supply manifold 72, an exit leg 100 communicating with the exhaust manifold 74; and medial legs/branches 104 and 106, in the midsections of the flow-channels, communicating with the inlet and exit legs 96 and 100 as more fully described in copending United States Patent Application Number ~~(Attorney's docket no. GP-303028)~~ USSN 10/654,504, that is filed concurrently herewith and is intended to be incorporated herein by reference. The inlet legs 96 communicate with the supply manifold 72 via a plurality of openings 108 and a slot 110 that communicates with the manifold 72 via a passageway (not shown) that underlies section 112 of the plate 60. Similarly, the exit legs 100 communicate with the exhaust manifold 74 via a plurality of openings 114 which in turn communicate with the exhaust manifold 74 via a slot 116 that communicates with the manifold 74 via a passageway (not shown) that underlies section 118 of the plate 60. The flow-restrictors are

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strategically positioned/located throughout the flow-field, as needed, to achieve desired pressure differentials therein. Several, but not all, such positionings/locations, are discussed hereinafter in conjunction with Figs.8 – 10.